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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,540	02/25/2002	Michinobu Mizumura	500.41254X00	8255

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EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 09/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

10/080,540

Applicant(s)

MIZUMURA ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 February 2002 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 2/25/02 fails to comply with 37 CFR 1.98(a)(1), which requires a list of all patents, publications, or other information submitted in a proper form of PTO-1449 or PTO SB/08A or 08B for consideration by the Office. Since the IDS form not in a proper form of PTO-1449, it has been placed in the application file, but the information referred to therein has been listed on form PTO-892 and the examiner has considered them.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Rejections - 35 USC § 103

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukazawa (JP-2000-252359) in view of Nakagawa (JP-03-330278).

As to claim 1, Fukazawa discloses an etching method for organic insulation layer, wherein a plasma is formed by introducing a gaseous mixture of hydrogen and nitrogen or ammonia gas and measuring the light emission spectrum intensity ratio of Cyan (CN) and hydrogen atom (H) with respect to specific flow rates at a prescribed value. (see the abstract, paragraph 0040 of the and figures 5b and 6).

Fukazawa fail to teach carrying out the etching process while keeping the measured value at a value not exceeding a prescribed value.

However, in a method of plasma etching, Nakagawa teaches process is controlled in such that the light emission intensity ratio remains at a constant value (see the abstract).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Nakagawa's teaching into Fukazawa's etching process for providing the light emission intensity ratio at a constant value in order to achieve a good reproducibility of selectivity of etching velocity for a long period as taught by Nakagawa.

As to claim 2, Fukazawa teaches that the etching process is carrying out at different flow rates of H₂/N₂ in a range of 100/0-50/50-0/100, which includes a mixing ratio of hydrogen to nitrogen gas is 10 or more (see paragraph 0041).

Fukazawa does not explicitly teach that the light emission spectral intensity ratio CN/H is at 1 or less.

However, Fukazawa teaches that the light emission spectral intensity ratio of CN and H is measured for each of the flow rate of H_2/N_2 in a range of 100/0-50/50-0/100, which includes a mixing ratio of hydrogen to nitrogen gas is 10 or more that would provide the desired value of the light intensity ratio of CN/H, wherein H represents a light emission spectral intensity of hydrogen atom at a wavelength of about 486 nm and CN represents a light emission spectral intensity of Cyan molecule at a wavelength of about 388 nm (see the paragraphs 0040- 0041 and figures 5 and 6).

Therefore, one skilled in the art would have been found obvious that the intensity ratio of CN/H is achievable in a range of 1 or less within an overlapping range taught by Fukazawa as the intensity ratio is measured based on the specific flow rates of the mixing gas of hydrogen and nitrogen (figure 6) for quickly etching the organic insulation film as taught by Fukazawa.

Furthermore, it has been held that claimed ranges overlap or lie inside ranges disclosed by the prior art is a prima facie case of obviousness. *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

As to claim 3, Fukazawa fails to teach that controlling the flow rate of hydrogen gas to maintain the light emission spectral intensity ratio at a desired value.

However, in a method of plasma etching, Nakagawa teaches that flow rate of an etching gas is controlled for providing the light emission intensity ratio at a constant value (see the abstract).

Therefore, it would have been obvious to one skilled in the art at the time of claimed invention to combine Nakagawa's teaching into Fukazawa's etching process for

providing the light emission intensity ratio at a constant value in order to achieve a good reproducibility of selectivity of etching velocity for a long period as taught by Nakagawa.

As to claim 4, Fukazawa teaches that the pressure is controlled at a constant value of 0.8 pa (see paragraph 0034).

As to claim 5, Fukazawa teaches all the limitation disclosed above and also teaches that the pressure is controlled at a value of 0.8 pa, which is lower than 10 pa (see paragraph 0034).

As to claim 6, Fukazawa teaches that the mixing ratio of nitrogen to hydrogen can be maintained in a range of 100/0-50/50-0/100, which includes the limitation of a mixing ratio of 10 or more (see paragraph 0041).

As to claim 7, Fukazawa teaches that the flow rate of nitrogen and hydrogen is 100 sccm (see paragraph 0041).

However, it would have been obvious to one ordinary skilled in the art at the time of claimed invention to optimize the flow rate, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch* F.2d 272, 205 USPQ (CCPA 1980).

5. Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukazawa (JP-2000-252359) in view of Nakagawa (JP-03-330278) and further in view of Ye et al (6,080,529).

Modified Fukazawa discusses in the above paragraph 4 but fails to teach that the gas mixture is hydrogen and ammonia with a mixing ratio of hydrogen to ammonia gas is 10 or more.

However, in a method of etching organic film, Ye et al teach that a gas mixture of hydrogen and ammonia or nitrogen could be used (col.7, lines 24-29).

Therefore, it would have been obvious to one ordinary skilled in the art at the time of claimed invention to combine Ye et al's teaching into modified Fukazawa's process because nitrogen and ammonia are functionally equivalent as the source of nitrogen atom for efficient removal of organic film as taught by Ye et al.

Modified Fukazawa remain silent about the mixing ratio of hydrogen to ammonia is 10 or more.

However, it would have been obvious to one ordinary skilled in the art at the time of claimed invention to optimize the mixing ratio at 10 or more for reducing the etching time by increasing the etching rate because hydrogen is the principle etching component and ammonia could be the source of nitrogen used as an inert gas as known in the art.

As to claim 9, it would have been obvious to one ordinary skilled in the art at the time of claimed invention to optimize the flow rate, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch* F.2d 272, 205 USPQ (CCPA 1980).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Han et al (6,548,416) disclose a plasma etching process, wherein a gas mixture of hydrogen and nitrogen is used to form a characteristic CN emission signal (col.6, lines 43-64).

Nishizawa (6,617,244) disclose a dry etching process for a low dielectric insulation layer, wherein etching end-point is detected from the change of the light emitting intensity of CN compound (col.6, lines 13-18).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (703) 305-1929. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (703) 305-2667. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed
Examiner
Art Unit 1765